IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)		
	)		
Philip Jacoby	)	Art Unit:	1772
	)		
Application No.: 10/824,730	)	Examiner:	Chevalier, A. A.
	)		
Filing Date: April 15, 2004	)	Confirmation:	6721
	)		
For: "EXTRUDED POLYPROPYLENE SHEETS CONTAINING BETA SPHERULITES"	)		

DECLARATION UNDER 37 C.F.R. § 1.132 OF PHILIP JACOBY, PHD

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer No. 23859

Sir:

The undersigned, Philip Jacoby, a citizen of the United States residing at 4325 Granby Way, Marietta, Georgia 30062, declares that:

1. I am the inventor listed on the above-identified application and all the tests disclosed in the application and described herein were performed under my supervision.

2. I hold a Bachelor of Science (B.S.) degree in Chemistry from The City College of New York and a Doctor of Philosophy (Ph.D.) degree in Physical Chemistry from The University of Wisconsin in Madison, Wisconsin.

3. I have been conducting research in the fields of polymer characterization and testing for over 31 years. In particular, much of my research has dealt with the preparation and evaluation of polymer additives and modified polymers. More specifically, I have conducted extensive research in the fields of polypropylene modification and beta nucleation. My research on beta nucleation in polypropylene began in 1979 while employed by the Amoco Chemical

Company in the Polymer Physics Division. This research led to several patents, several commercial products, and recognition as one of the world's leading experts in the area of beta nucleation. In addition to the issued patents in which I am the principal inventor, I have also published papers on this topic and given presentations at several technical conferences.

4. I am an author on over ten scientific publications relating to my research. Additionally, I am named as an inventor on at least ten issued United States patents (*e.g.*, U.S. Patent Nos. 5,594,070; 5,317,035; 5,310,584; 5,236,963; 5,176,953; 4,975,469; and 4,386,129, which deal with the use of beta nucleation) and four pending patent applications.

5. From 1975 to 2002, I was employed as a research chemist in the Polymer Physics and Polypropylene Divisions of the Amoco Chemical Company, which later became BP Amoco Chemicals. From 2002 to the present, I have been employed as Vice President of Technology of Mayzo, Inc., a Norcross, Georgia polymer research, development, and manufacturing company. One responsibility at Mayzo has been to develop a beta nucleant masterbatch for use in polypropylene. This led to a commercial product for producing polypropylene geogrids and oriented polypropylene films.

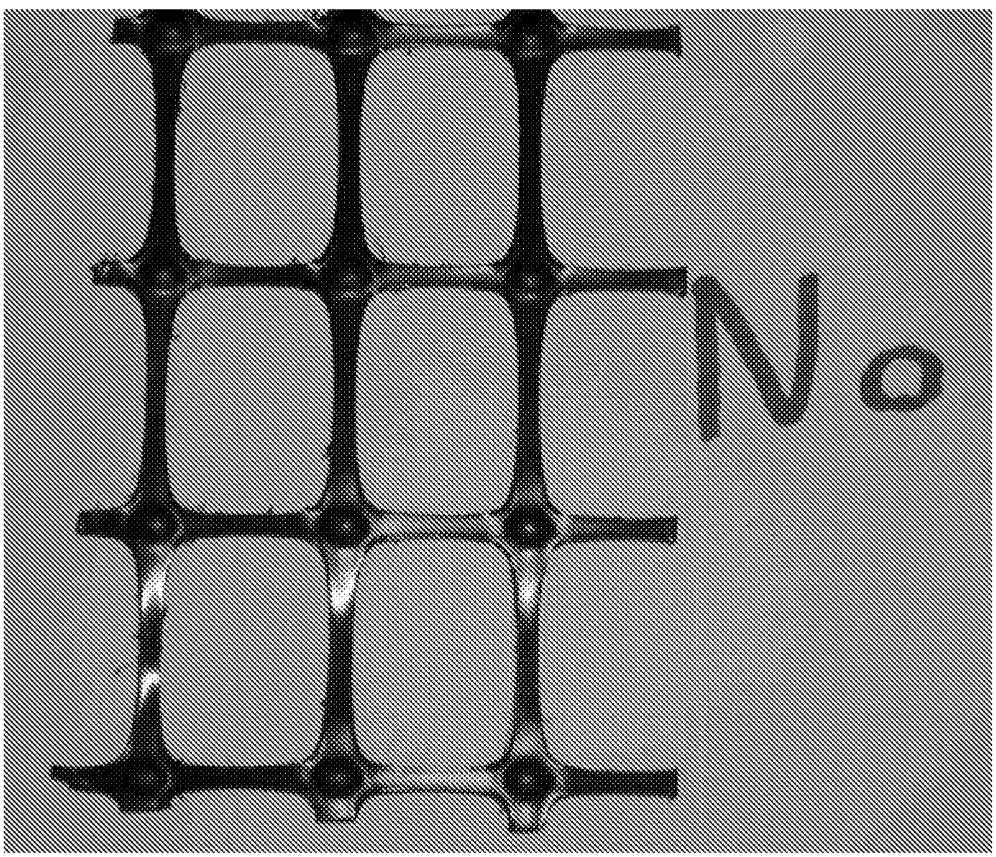
6. I have reviewed the Office Action mailed February 23, 2007, and the references cited and/or discussed therein. In particular, I have read and understood U.S. Patent No. 4,374,798 to Mercer ("the Mercer reference") in view of U.S. Patent No. 5,310,584 to Jacoby *et al.* ("the Jacoby reference"). Moreover, in addition to being the inventor listed in the instant application, I am also the inventor listed on the face of the Jacoby reference.

7. Based on my review of these references, it is my opinion that the invention claimed in application serial no. 10/824,730 would not have been obvious in view of the cited references. Specifically, at the time the application was filed, a polymer chemist would not have used the polymer composition disclosed in the Jacoby reference to make the polymer grid disclosed in the Mercer reference for at least four reasons.

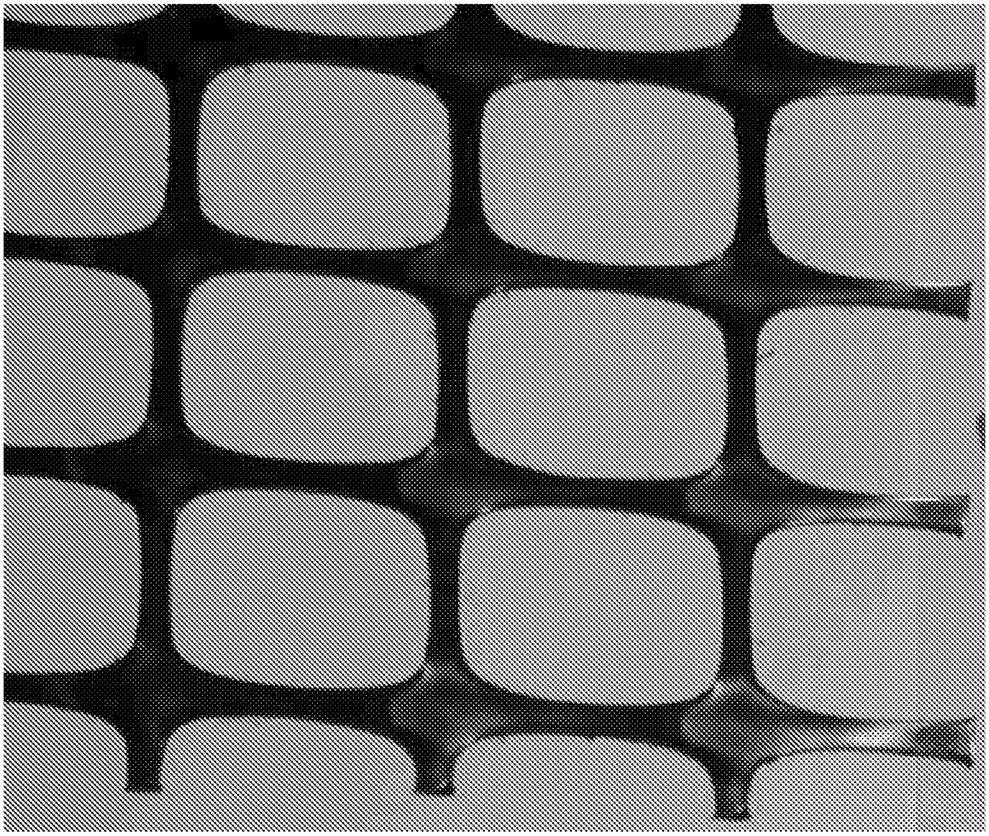
8. First, oriented webs produced from the claimed perforated polypropylene webs have a thickness in the node junction region between the machine direction and transverse direction

strands that is less than conventional extruded sheets with no added beta nucleant. Specifically, as shown in Table 2 of the specification, the node thickness for an oriented web produced from the claimed perforated polypropylene webs (#2, 12 ppm Q-dye) has a node thickness of 1.80 mm, compared to a node thickness of 3.81 mm for an oriented web produced from a conventional extruded sheet with no added beta nucleant (#1, 0 ppm Q-dye). With a node thickness of less than 50% of that in conventional webs, the inventive webs have more material in the strands between nodes, thereby providing substantially more uniform oriented webs than grid produced by conventional techniques, for example, those described in the Mercer reference.

9. The appearance of geogrids made with and without beta nucleation are illustrated below:



Geogrid produced <u>without</u> Beta Nucleation



Geogrid produced <u>with</u> Beta Nucleation

10. One of skill in the art would readily appreciate that the flattening of the nodes observed in the beta nucleated extruded sheet results from node region polymer being re-distributed into the oriented strands. Since these oriented strands, which provide the geogrid with strength and rigidity, now contain more polymer, the resulting geogrid has improved strength and rigidity. There is nothing in either Mercer or the prior Jacoby patents that would have predicted this effect. In contrast, in the Jacoby reference, the observed strength and stiffness improvements result from more uniform wall thickness and thicker walls in the final thermoformed polypropylene container. There are no nodes in a thermoformed container since the extruded sheet is not perforated, and the walls of the container have no openings. Therefore the mechanism for improving the strength and rigidity of a thermoformed container produced using beta nucleation is completely different from the mechanism which operates in a geogrid.

11. Second, oriented webs produced from the claimed perforated polypropylene webs have improved tensile strength compared to conventional extruded sheets with no added beta nucleant. Specifically, as shown in Table 4 of the specification, the machine direction ultimate tensile strength (24.3 kN/m) and the transverse direction ultimate tensile strength (36.4 kN/m) for an oriented web produced from the claimed perforated polypropylene webs (sample 3, 12 ppm Q-dye) is much greater than the machine direction ultimate tensile strength (19.2 kN/m) and the transverse direction ultimate tensile strength (28.8 kN/m) for an oriented web produced from a conventional extruded sheet with no added beta nucleant (sample 6, 0 ppm Q-dye). With an ultimate tensile strength of at least 25% greater than that for conventional webs, the claimed webs provide substantially stronger oriented webs than grids produced by conventional techniques, for example, those described in the Mercer reference.

12. Third, oriented webs produced from the claimed perforated polypropylene webs have increased torsional stability compared to conventional extruded sheets with no added beta nucleant. Specifically, as shown in Table 4 of the specification, the torsional stability (8.7 cm-kg/deg) for an oriented web produced from the claimed perforated polypropylene webs (sample 3, 12 ppm Q-dye) is much greater than the torsional stability (6.5 cm-kg/deg) for an oriented web produced from a conventional extruded sheet with no added beta nucleant (sample 6, 0 ppm Q-dye). With a torsional stability of at least 33% greater than that of that for conventional webs, the inventive webs provide substantially more stable oriented webs than grids produced by conventional techniques, for example, those described in the Mercer reference. This torsional stability is again a consequence of a redistribution of polymer from the node regions to the oriented strands when the precursor sheet is beta nucleated.

13. Fourth, oriented webs produced from the claimed perforated polypropylene webs can be prepared from thinner extruded sheets having a lower mass per area (basis weight) compared to conventional extruded sheets with no added beta nucleant, while still maintaining physical properties (*e.g.*, tensile strength and torsional stability) that exceed that of the heavier, non-nucleated webs. Specifically, as shown in Table 4 of the specification, an oriented web

produced from the claimed perforated polypropylene webs (sample 3; 12 ppm Q-dye; 4.5 mm; 0.309 kg/m^2) has the same extruded sheet thickness and a similar mass per area to that of an oriented web produced from a conventional extruded sheet with no added beta nucleant (sample 6; 0 ppm Q-dye; 4.5 mm; 0.313 kg/m^2), while exhibiting substantially superior tensile strength and torsional stability (*see, e.g.*, Table 4, columns 3-8 and 10). Further, as also shown in Table 4 of the specification, oriented webs produced from the claimed perforated polypropylene webs (sample 4; 12 ppm Q-dye; 4.15 mm; 0.268 kg/m^2) (sample 5; 12 ppm Q-dye; 3.84 mm; 0.254 kg/m^2) each have a lower extruded sheet thickness and a lower mass per unit area compared to an oriented web produced from a conventional extruded sheet with no added beta nucleant (sample 6; 0 ppm Q-dye; 4.5 mm; 0.313 kg/m^2), such as a grid described in the Mercer reference, while still exhibiting superior tensile strength and torsional stability (*see, e.g.*, Table 4, columns 3-8 and 10).

14. Thus, the claimed invention can provide substantially stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area, compared with conventional techniques, for example, those described in the Mercer reference. These superior properties of the oriented webs produced from the claimed perforated polypropylene webs would not have been expected by a polymer chemist at the time the application was filed. Specifically, it would not have been obvious to use a beta nucleated polypropylene employed in a <u>thermoforming</u> process as a starting material in the process disclosed in the Mercer reference, which involves biaxially orienting a perforated polypropylene sheet, to produce stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area.

15. Additionally, as the inventor of the Jacoby reference, I can confirm that the process disclosed was, at that time, intended only for <u>thermoforming</u> applications. In the Jacoby reference only thermoforming processes – which generally involve heating a thermoplastic sheet above its softening point, forming the softened sheet, and allowing the formed sheet to cool and harden – were used to produce articles, such as containers, having improved sidewall strength, reduced warp, and improved low-temperature impact resistance. These properties have

no direct analogy in a process used to produce a geogrid since a geogrid is not a container and has no sidewalls.

16. I declare that all statements made herein of my own knowledge and belief are true and that all statements made on information and belief are believed to be true, and further, that the statements are made with the knowledge that willful false statements are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Philip Jacoby, PhD

Dated: May 23, 2007